

- 33 -

WHAT IS CLAIMED IS:

1. A method for converting image data from a lower bit depth representation to a higher bit depth representation, the method
5 comprising:
 - identifying pixels in a saturation region wherein a color model value of each individual pixel in the saturation region is one of: above an upper saturation threshold and below a lower saturation threshold; and
 - 10 adjusting the color model value of each of the individual pixels in the saturation region by a corresponding adjustment, a magnitude of each adjustment dependent, at least in part, on a number of pixels between the corresponding pixel and an edge of the saturation region.
- 15 2. A method according to claim 1 comprising identifying pixels in the saturation region by scanning the color model values of pixels in the image data along a first scan axis to determine a start pixel at one edge of a saturation region and an end pixel at another
20 edge of the saturation region.
3. A method according to any one of claims 1 to 2 comprising determining the magnitude of each adjustment based, at least in part, on a function of the number of pixels between the
25 corresponding pixel and the edge of the saturation region, wherein the function has an extremum in the saturation region.

- 34 -

4. A method according to claim 3 comprising identifying pixels in the saturation region by scanning the color model values of pixels in the image data along a first scan axis to determine a start pixel at one edge of a saturation region and an end pixel at another edge of the saturation region.
5. A method according to claim 4 wherein the extremum of the function is located substantially midway between the start pixel and the end pixel.
6. A method according to claim 5 wherein the function comprises a parabola having a vertex located substantially midway between the start pixel and the end pixel.
7. A method according to any one of claims 4 to 6 wherein the magnitude of the function at the extremum depends, at least in part, on a number of pixels between the start pixel and the end pixel.
8. A method according to any one of claims 4 to 7 wherein the magnitude of the function at the extremum is determined on the basis of at least one of: a gradient between the color model values of the start pixel and at least one pixel preceding the start pixel and a gradient between the color model values of the end pixel and at least one pixel following the end pixel.

- 35 -

9. A method according to claim 5 wherein the function rises linearly from the start pixel toward a pixel located substantially midway between the start pixel and the end pixel and wherein the function decreases linearly from the pixel located substantially midway between the start pixel and the end pixel toward the end pixel.
10. A method according to any one of claims 4 to 9 wherein the function is unity for at least one of: the start pixel and the end pixel.
11. A method according to claim 2 comprising determining the magnitude of each adjustment based, at least in part, on a number of pixels between the start pixel and the end pixel.
12. A method according to claim 2 comprising determining the magnitude of each adjustment on the basis of at least one of: a gradient between the color model values of the start pixel and at least one pixel preceding the start pixel and a gradient between the color model values of the end pixel and at least one pixel following the end pixel.
13. A method according to claim 4 comprising determining a location of the extremum on the basis of at least one of: a gradient between the color model values of the start pixel and at least one pixel preceding the start pixel and a gradient between the color model values of the end pixel and at least one pixel following the end pixel.

- 36 -

14. A method according to any one of claims 1 to 13 comprising determining the magnitude of each adjustment based, at least in part, on a number of pixels in the saturation region.

5 15. A method according to any one of claims 1 to 14 comprising determining the magnitude of each adjustment based, at least in part, on a gradient between the color model values of at least one pixel on the edge of the saturation region and at least one pixel outside of the saturation region.

10

16. A method according to any one of claims 1 to 15 comprising determining the magnitude of each adjustment based, at least in part, on one or more temporally previous values of the color model value for the corresponding pixel.

15

17. A method according to any one of claims 1 to 16 comprising determining the magnitude of each adjustment based, at least in part, on one or more other color model values for the corresponding pixel.

20

18. A method according to any one of claims 1 to 17 comprising determining the magnitude of each adjustment based, at least in part, on: detecting a lens flare pattern surrounding the saturation region; and using a model of the lens flare pattern to predict color
25 model values of the pixels in the saturation region.

- 37 -

19. A method according to any one of claims 1 to 18 comprising initially adjusting the color model values of the pixels in the image data to form an intermediate higher bit depth representation of the image data and wherein adjusting the color model value of each of the individual pixels in the saturation region is performed on pixels of the intermediate higher bit depth representation.
20. A method according to claim 19 wherein initially adjusting the color model values of the pixels in the image data comprises at least one of: scaling the color model values of the pixels in the image data; and offsetting the color model values of the pixels in the image data.
21. A method according to claim 20 comprising scaling the color model values of the pixels in the image data and wherein scaling color model values of the pixels in the image data is uniform as between pixels in the image data.
22. A method according to claim 19 wherein identifying pixels in a saturation region is performed on pixels of the intermediate higher bit depth representation.

- 38 -

23. A method according to any one of claims 2 and 4 to 13 wherein scanning color model values of pixels in the image data along a first scan axis comprises determining start and end pixels for one or more additional saturation regions within a line of pixels, wherein the color model value of each individual pixel in the one or more additional saturation regions is one of: above the upper saturation threshold and below the lower saturation threshold.
24. A method according to claim 23 comprising adjusting the color model value of each of the individual pixels in the one or more additional saturation regions by a corresponding adjustment, a magnitude of each adjustment for each pixel in each of the one or more additional saturation regions dependent, at least in part, on a number of pixels between the corresponding pixel and at least one of: the start pixel of the additional saturation region and the end pixel of the additional saturation region.
25. A method according to any one of claims 2, 4 to 13 and 23 to 24 comprising repeating scanning color model values for a plurality of lines of pixels of the image data along the first scan axis and adjusting the color model value of each of the individual pixels in each saturation region until the entire image has been scanned and adjusted along the first scan axis.

- 39 -

26. A method according to claim 25 comprising repeating scanning color model values for a plurality of lines of pixels of the image data along a second scan axis and adjusting the color model value of each of the individual pixels in each saturation region until the entire image has been scanned and adjusted along the second scan axis.
27. A method according to claim 26 comprising combining color model values of image data scanned and adjusted along the first scan axis with color model values of image data scanned and adjusted along the second scan axis to form the higher bit depth representation.
28. A method according to claim 27 wherein combining color model values comprises obtaining an average of color model values of image data scanned and adjusted along the first scan axis with color model values of image data scanned and adjusted along the second scan axis.
29. A method according to claim 27 wherein combining color model values comprises obtaining an average of color model values of image data scanned and adjusted along the first scan axis with color model values of image data scanned and adjusted along the second scan axis to obtain intermediate values and blurring groups of two or more adjacent pixels of the intermediate values to form the higher bit depth representation.

- 40 -

- 5 30. A method according to any one of claims 1 to 29 comprising adjusting the color model value of each of the individual pixels in the saturation region by scaling the color model value of each of the individual pixels in the saturation region by a corresponding scaling factor.
- 10 31. A method according to any one of claims 1 to 30 wherein the color model values comprise a mathematical combination of other color model values.
- 15 32. A method according to any one of claims 1 to 31 comprising, after adjusting the color model values of the individual pixels in the saturation region, further adjusting the color model values of all of the pixels in the image data to maximize the range of the color model values in the higher bit depth representation.
- 20 33. A computer program product comprising a medium carrying computer readable instructions which, when executed by a processor, cause the processor to execute a method for converting image data from a lower bit depth representation to a higher bit depth representation, the method comprising:
- 25 identifying pixels in a saturation region wherein a color model value of each individual pixel in the saturation region is one of: above an upper saturation threshold and below a lower saturation threshold; and
- adjusting the color model value of each of the individual pixels in the saturation region by a corresponding adjustment, a magnitude of each adjustment dependent, at least in part, on a

- 41 -

number of pixels between the corresponding pixel and an edge of the saturation region.

34. A system for processing image data, the system comprising a processor for converting image data from a lower bit depth representation to a higher bit depth representation, the processor configured to:

identify pixels in a saturation region wherein a color model value of each individual pixel in the saturation region is one of:
above an upper saturation threshold and below a lower saturation threshold; and

adjust the color model value of each of the individual pixels in the saturation region by a corresponding adjustment, a magnitude of each adjustment dependent, at least in part, on a number of pixels between the corresponding pixel and an edge of the saturation region.